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09/911,784	07/24/2001	Masaharu Yoshiyama	1503.65719	3902

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EXAMINER

PHAM, KHANH B

ART UNIT

PAPER NUMBER

2167

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/911,784

Applicant(s)

YOSHIYAMA ET AL.

Examiner

Khanh B. Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.
2. Applicant's amendment filed on August 31, 2004 has been entered. Claims 1-16 have been amended. Claims 1-16 are pending in this Office Action.

Claim Objections

3. **Claim 13 is objected** to because of the following informalities: misspelled word "fro" at line 2 should be changed to "for". Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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5. **Claims 1, 4, 10, 13 and 16 are rejected under 35 U.S.C. 102(e)** as being anticipated by Chaudhuri et al. (US 6,223,171 B1), hereinafter "**Chaudhuri '171**".

As per claims 1, 10,13, and 16, Chaudhuri '171 teaches a method, a computer readable medium, and apparatus (Col. 2, lines 63-67) for "retrieving data from a database according to retrieval condition set forth in an issued SQL sentence" (Col. 6 lines 22-30) comprising:

- "making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when retrieval is performed without an index" at Col. 23 lines 39-67 and Fig. 15;

(Chaudhuri '171 teaches the step of comparing costs of the workload (i.e., "retrieval condition") between the configurations with and without an index on column B and a two-column index (B,A))

- "generating an index corresponding to the retrieval condition if the cost required when the retrieval is performed without an index is higher as a result of the cost comparison" at Col. 23 line 64 to Col. 24 line 6;

(Chaudhuri '171 teaches the step of building the two-column index (B,A) as a result of the cost comparison.)

- "and retrieving the data from the database by using the generated index" at Col. 1 lines 20-35.

(Chaudhuri '171 teaches the indexes are used to enhance performance in processing queries.)

As per claim 4, Chaudhuri '171 teaches the method according to claim 1 as discussed above. Chaudhuri '171 also teaches: "managing data of the number of accesses, a generation date and time, and an update frequency of the generated index" at Figs. 8-13; and "deleting the generated index according to management status of the data" at Col. 16 lines 35-45.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 3, 8, 12 and 15 rejected under 35 U.S.C. 103(a)** as being unpatentable over **“Chaudhuri ‘171”** as applied to claims 1, 4, 10, 13, 16 above, and in view of Chaudhuri et al. (US 6,169,983 B1), hereinafter **“Chaudhuri ‘983”**.

As per claims 3, 12, and 15 Chaudhuri ‘171 teaches a method, a computer readable medium and apparatus for retrieving data from a database according to retrieval conditions set forth in an issued SQL sentence (Col. 6 lines 22-30), comprising:

- “making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when retrieval is performed without an index” at Col. 23 lines 39-67 and Fig. 15;
- “if the cost required when the retrieval is performed without an index is higher as a result of the cost comparison, generating an index corresponding to the retrieval condition” at Col. 23 line 64 to Col. 24 line 6;
- “retrieving the data from the database by using the generated index” at Col. 1 lines 20-35.

The difference between Chaudhuri ‘171 and the invention of claims 3, 12, 15 is that Chaudhuri ‘171 teaches the step of generating a new index but does not teach that the new index is generated by combining two or more indexes as claimed. However, Chaudhuri ‘983 teaches a similar method for index selection, including the step of: “determining whether or not two or more indexes which satisfy the retrieval condition by being combined exist among a plurality of already generated indexes by combining the two or more indexes” at Col. 14 lines 15-52, and “generating an index corresponding to

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the retrieval condition by combining the two or more indexes, if the two or more indexes exist” at Col. 14 lines 53-55. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri ‘171 and Chaudhuri ‘983’s teachings in order to reduce the time required to generate a new index and reduce space requires to store the new index. Generating a new index by combining two or more existing indexes as taught by Chaudhuri ‘983 would “help minimize the amount of storage space consumed by the indexes while minimizing any increase in cost of executing queries of the workload against the database using the indexes”, as noted by Chaudhuri ‘983 at Col. 1, lines 45-50.

As per claim 8, Chaudhuri ‘171 and Chaudhuri ‘983 teach the method according to claim 3 discussed above. Chaudhuri ‘171 also teaches the steps of: “managing data of the number of accesses, a generation date and time, and an update frequency of the generated index” at Figs. 8-13; and “deleting the generated index according to management status of the data” at Col. 16 lines 35-45.

9. **Claims 2, 5-7, 11, 14 are rejected under 35 U.S.C. 103(a)** as being unpatentable over **Chaudhuri ‘171**, and in view of Smith et al. (US 5,404,510 A), hereinafter “**Smith**”.

As per claims 2, 11, 14, Chaudhuri ‘171 teaches a method, a computer readable medium and apparatus for retrieving data from a database according to retrieval conditions set forth in an issued SQL sentence (Col. 6 lines 22-30), comprising:

- “making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when retrieval is performed without an index” at Col. 23 lines 39-67 and Fig. 15;
- “if the cost required when the entire retrieval is performed is higher as a result of the cost comparison, generating a second index which satisfies only the retrieval condition” at Col. 23 line 64 to Col. 24 line 6;
- “and retrieving a database by using the generated second index” at Col. 1 lines 20-35.

The difference between Chaudhuri '171 and the invention of claims 2, 11, 14 is that Chaudhuri '171 does not teach that the new index is generated by using the first index, if the first index which satisfies the wider condition exists. However, Smith teaches a similar method for index selection, including the steps of: “determining whether or not a first index which satisfies a condition wider than the retrieval condition exists among already generated indexes” and “generating a second index which satisfied only the retrieval condition by using the first index, if the first index which satisfies the wider condition exists” at Col. 12 lines 32-65. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri '171 and Smith's teachings in order to reduce the time requires to generate a new index. Generating a new index from an existing wider index requires less time because it deals with only a subset of the data in the existing index, instead of the entire set of data in the database. Combining Smith's teaching with Chaudhuri

'171's method would therefore significantly reduce the time required to generate a new index.

As per claim 5, Chaudhuri '171 teaches the database retrieving method according to claim 1 as discussed above. Smith teaches:

- “determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a data update or deletion” at Col. 6 lines 22-33;
- “determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists” at Col. 1 lines 22-33;
- “and deleting the index prior to start of the access process, if the access performance is degraded” at Col. 6 lines 42-43.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri '171 and Smith's teachings to improve performance of the system. Adding the steps as taught by Smith to Chaudhuri '171 system would allow the system to identify and remove high cost indexes which are expensive to maintain, therefore improve the performance of the system.

As per claim 6, Chaudhuri '171 and Smith teach the method according to claim 2 discussed above. Chaudhuri also teaches: “managing data of the number of accesses, a generation date and time, and an update frequency of the generated index”

at Figs. 8-13; and "deleting the generated index according to management status of the data" at Col. 16 lines 35-45.

As per claim 7, Chaudhuri '171 and Smith teach the database retrieving method according to claim 2 as discussed above. Smith further teaches:

- "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a date update or deletion" at Col. 6 lines 22-33;
- "determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists" at Col. 6 lines 22-33;
- "and deleting the index prior to start of the access process, if the access performance is degraded" at Col. 6 lines 42-43.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri '171 and Smith's teachings to improve performance of the system. Adding the steps as taught by Smith to Chaudhuri '171 system would allow the system to identify and remove high cost indexes which are expensive to maintain, therefore improve the performance of the system.

10. **Claims 9 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Chaudhuri '171 and Chaudhuri '983 as applied to claims 3, 8, 13, and 15 above, and further in view of **Smith**.

As per claim 9, Chaudhuri '171 and Chaudhuri '983 teach the database retrieving method according to claim 3 as discussed above. Chaudhuri '171 and Chaudhuri '983 do not explicitly teach the steps of: "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a data update or deletion; determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists; and deleting the index prior to start of the access process, if the access performance is degraded". However, Smith teaches a similar method including the step of:

- "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a date update or deletion" at Col. 6 lines 22-33;
- "determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists" at Col. 6 lines 22-33;
- "and deleting the index prior to start of the access process, if the access performance is degraded" at Col. 6 lines 42-43.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri '171 and Chaudhuri '983's teachings with Smith's teaching so that "unimportant and volatile indexes may be pruned from the system" (Smith, Col. 6 lines 40-45), and therefore improve the performance of the database by reducing the cost of maintenance these indexes.

Response to Arguments

10. Applicant's arguments filed August 31, 2004 have been fully considered but they are not persuasive. The examiner respectfully traverses applicant's arguments.

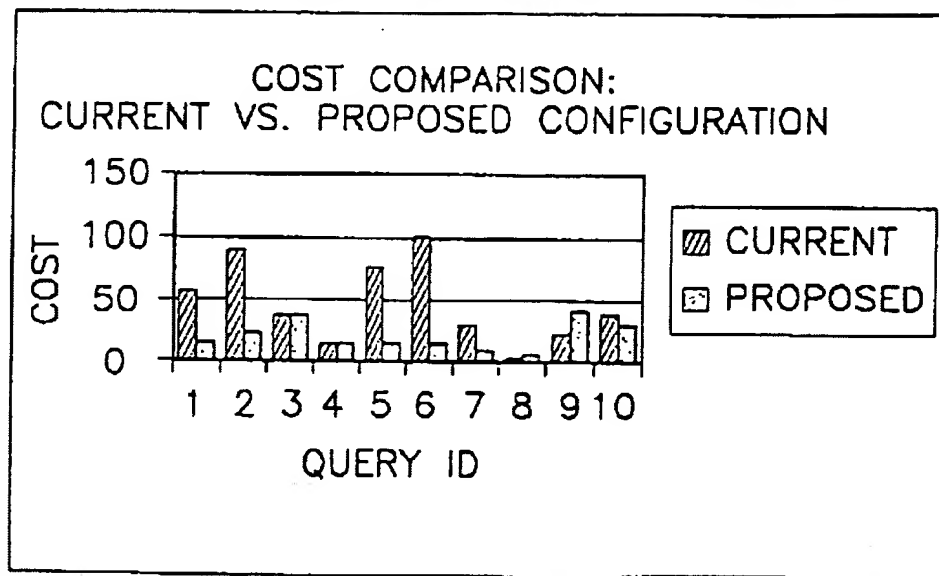
Regarding claims 1, 4, 10, 13 and 16 rejection on the basis of Chaudhuri '171, Applicant argued that Chaudhuri'171 does not teach: "a method for retrieving data from a database that make a cost comparison between retrieval with an index, and retrieval without an index". On the contrary, Chaudhuri'171 teaches the comparison between "Current VS. Proposed configuration", wherein the proposed configuration comprises **adding indexes on columns B** the table T, wherein current configuration is the configuration **without the index on column B** at Col. 23 lines 53-67 reproduced below:

In this case, an index on column A exists but an index on column B does not exist. The database administrator then 45
decides to explore hypothetical configuration scenarios that include an index on column B.

The database administrator decides to explore two what-if scenarios and evaluate each relative to the existing configuration. The database administrator first proposes a hypotheti- 50
cal configuration comprising the existing configuration with an additional non-clustered single-column index on column B of the table T₂. The database administrator compares the cost of the workload for this configuration with the cost of the workload for the existing configuration. Adding a single- 55
column index on column B produces a 5% improvement in total cost of the workload as illustrated in FIG. 15. By

Fig. 15 of the Chadhuri's 171 shows the comparison step, reproduced below:

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Fig.15

Applicant's arguments with respect to the 102 rejections based on Tenorio and Smith have been considered but are moot because the examiner did not maintain these rejections in this Office Action.

Conclusion

11. The prior art made of record, listed on form PTO-892, and not relied upon, if any, is considered pertinent to applicant's disclosure.

If a reference indicated as being mailed on PTO-FORM 892 has not been enclosed in this action, please contact Lisa Craney whose telephone number is (571) 272-3574 for faster service.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Pham whose telephone number is (571) 272-4116. The examiner can normally be reached on Monday through Friday 7:30am to 4:00pm.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Breene can be reached on (571) 272-4107. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Khanh B. Pham
Examiner
Art Unit 2167

KBP
February 4, 2005


Primary Examiner